ROBUR

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Installation, use and maintenance manual

Heaters Line F1 Series

Gas fired unit heaters
for heating medium-large areas

Natural gas/LPG fired

F1 GAS FIRED UNIT HEATERS

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SECTION 1 - GENERAL WARNINGS

- This manual is an integral and essential part of the product and must be given to the user.
- **Qualified service engineers are those having specific technical experience in the field of heating installation unit for domestic and industrial use. In the case of any doubt, contact your local agent or Manufacturer.**
- This unit must be exclusively used for the purpose it was intended. Any other use is to be considered improper and therefore dangerous.
  The manufacturer will not be held responsible for damages resulting from installation errors or failure to comply with the manufacturer's instructions.
- Do not obstruct the fan intake opening or the air delivery grids.
- In case of failure and/or poor operation, isolate the unit (disconnect it from the power supply and close the main gas cock), do not attempt any repair or direct servicing. Call **qualified service engineers** only.
  The manufacturer's authorised service centres using only original spare parts must only carry out any repair to the products.
  Misapplication of the above might compromise the safety of the unit.
  To ensure unit efficiency and correct operation, it is essential that **qualified service engineers** carry out annual maintenance following the manufacturer's instructions.
- Should the unit be sold or transferred to another owner, please ensure that the manual remains with the unit for use by the new owner and/or installer.
- Before turning the heater on, a **qualified service engineer** must check:
  - that electric and gas supply ratings are the same as those given in the data plate.
  - that the exhaust duct operates correctly.
  - that combustion air feed and exhaust occur correctly according to the existing standards.
  - the internal and external tightness of the pass supply line.
  - fuel flow control according to the heater's power requirements.
  - that the heater is supplied with the type of fuel for which it is pre-set.
  - that the gas supply pressure is within rating limits.
  - that the gas supply system is suitable to the heater and all safety and check-over devices prescribed by existing standards are duly installed.
- Do not use gas pipes to ground the appliance, or any other electrical appliance.
- Avoid unnecessary supply when unit is not in use and always close the main gas cock.
- If the appliance is turned-off for a longer time period, close the main gas supply cock and cut off the electrical supply.

WARNING!

If you smell gas

- do not operate electric switches, telephones or any other object or device which may cause sparks;
- open immediately doors and windows to create a cross-current of air to purify the room;
- shut-off the gas supply;
- call for a **qualified service engineer**

SECTION 2 - GENERALITY AND CHARACTERISTIC

OPERATION OF THE UNIT

- The F1 gas fired air heater is an independent heater appliance with airtight combustion circuit and forced air draft.
- It's designed for an indoor installation - inside the area to be heated.
- It's adjustable for the use of Natural Gas (G20) or LPG (G30/G31).
- The combustion circuit is airtight regarding heated room and conforms the standard EN 1020 for the C type appliances: the air inlet of the combustion air and the flue exhaust are outdoors and are ensured through the operation of combustion blower. The appliance is certified either for the B type installations, where is allowed combustion air inlet from indoors (from the area to be heated).
- A room thermostat, (not supplied with the unit) controls the heater operation.
- When the thermostat is turned on the flame control box, after the pre-purge period (about 40 seconds), ignites the burner.
- The flame sensor controls the ignition of the burner. If the flame does not appear the flame control unit locks out the heater:
- The combustion products pass through the heat exchangers, the air flow given by the axial fan provides warm air to the room.
- The airflow direction is regulated by means of adjustable louvres. A ''vertical louvres kit'' is also available on request for horizontal regulation of the airflow.
- The fan control thermostat allows the axial-flow fan to start automatically only when the heat exchangers are hot and to turn off when they are cold. This prevents cool air being blown into the room
- If heat exchangers overheat due to malfunction, the temperature limit thermostat cuts off the supply to the gas valve, thus interrupts fuel flow and turns off the main burner

NOTE

After removing the cause of overheating, **Qualified service engineer** should carry out resetting of the temperature limit thermostat,

- Ahead of the burner is installed the flue fan which makes the air-gas mixture and forces draft of the exhaust flues.
- In case of obstructions in the intake duct or flue fan malfunction, a differential pressure switch closes the gas valve and consequently stops fuel flow to the burner.
- In the summer time it's possible to activate only the axial fan to provide pleasant and refreshing air movement in the room. (see Section 4 - Paragraph "Summer").

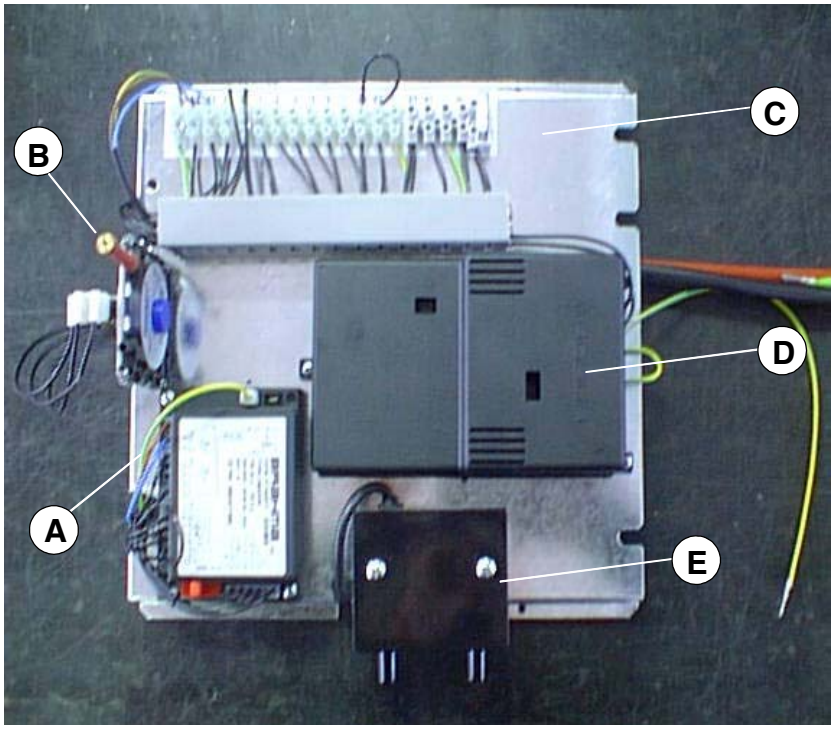
CONSTRUCTIVE CHARACTERISTICS

- premix burner made of stainless steel
- high head blower; models F1 51/61/81 are provided with electronic board that controls and guarantees constant speed of the blower;
- cylindrical combustion chamber made of stainless steel
- heat exchanger patented by Robur made of special aluminium alloy, fining horizontally on the air side and vertically on the flue side with extremely high capacity of thermal exchange
- insulated steel casing painted with epoxy powders
- axial fan with high air flow capacity
- according to the norms in force regarding the radio interference
- heat recovering post-ventilation

SAFETY AND CONTROL DEVICES

- High temperature limit switch: 100°C with manual reset (prevents the overheating of the heat exchangers)
- Pressure differential switch: for the control of the correct flue fan operation; when fan not operates correctly or the flue/air inlet ducts are obstructed the pressure switch stops the gas supply by closing the gas valve.
- Gas valve: in the case that one of the safety devices is activated (limit thermostat, safety thermostat etc.) the gas valve is automatically de-energised with contemporary cut-off the burner's gas supply.
- Electrical supply: 230 V – 50 Hz
- Operational temperature: 0°C to + 60°C
- Model: HONEYWELL VK 4125A for the Heaters F1 21. 31. 41. 51. 61
  BM 762 for the Heater Model F1 81

- Ignition and flame control box: controls the ignition and flame of the premix burner; if the is flame not detected during the safety period the flame control box will stop the appliance; with manual reset.
- Safety time: ignition 10 seconds
- Purge time: 40 seconds
- Power supply: 230V – 50 Hz
- Flame control box model: BRAHMA CM32PR
- Ignition transformer: BRAHMA TC2LTCAF / EICHHOFF 4718/2



A) flame control box
B) pressure switch
C) fuse 6,3A 5x20
D) speed regulation board
E) ignition transformer

Figure 1

TECHNICAL CHARACTERISTICS

MODEL		UNIT	F1 21	F1 31	F1 41	F1 51	F1 61	F1 81
Appliance Category			II_{2H3+}					
Appliance type			C_{13} - C_{33} - B_{23} - C_{63} - C_{53}					
Nominal heat input *(5)*		kW	23,08	30,77	37,15	48,35	61,32	77,14
		BTU	78804	105046	126841	165072	209357	263369
Nominal heat output		kW	21	28	33,8	44	55,8	70,2
		BTU	71698	95597	115407	150224	190520	239668
Efficiency *(5)*		%	91	91	91	91	91	91
Nominal air flow *(1)*		m^3/h	2000	2700	3400	4200	5200	7800
Temperature rate		K	31,1	30,7	29,5	31	31,8	26,7
Gas Consumption *(2)*	Natural Gas	m^3/h	2,43	3,25	3,93	5,11	6,49	8,16
	LPG G30	kg/h	1,80	2,42	2,93	3,81	4,84	6,09
	LPG G31	kg/h	1,78	2,38	2,87	3,74	4,75	5,97
Inlet gas pressure	Natural Gas	mbar	20					
	LPG. G30		30					
	LPG G31		37					
Diameter gas inlet		"	3/4F					
Pipe Diameter	air	mm	80					
	flue	mm	80					
Voltage			230V - 50Hz					
Wattage		W	260	400		450	640	900
Operating temperature		°C	0° +35°*(4)*					
Fuse		A	6,3					
Throw (residual air speed >1m/s) *(3)*		m	14	16	20	22	25	29
Noise level 6 m distance								
in free field		dB(A)	41	43	44	46	47	49
in tipycal installation		dB(A)	53	55	56	57	60	63
Weight		kg	55	59	68	80	90	108

Table 1

1 At 20°C - 1013mbar

2 At 15°C - 1013mbar

3 THROWS FOR GUIDANCE ONLY. THROW DEPENDS ON HEIGHT OF THE BUILDING, MOUNTING HEIGHT OF THE HEATER, ROOM TEMPERATURE AND LOUVRE SETTING.

4 WARNING: THE ROOM OPERATIONAL TEMPERATURE IS BETWEEN 0° AND +35°C ;THE APPLIANCE'S COMPONENTS OPERATIONAL TEMPERATURE IS BETWEEN 0° AND +60°C

5 DATA REFERED TO THE LOW HEAT VALUE (9,45 kWh/m^3 - 15°C 1013 mbar)

WITH THE AIM OF CONTINUOUSLY IMPROVING THE QUALITY OF ITS PRODUCTS, THE MANUFACTURER RESERVES THE RIGHT TO VARY ABOVE INFORMATION WITHOUT ANY PRIOR NOTICE.

DIMENSIONS OF THE UNITS

	A	B	C	D	E	F	G	H	J	L	N
F1 21	630	640	800	490	370	405	440	430	120	285	95
F1 31	630	640	800	490	370	405	440	430	120	285	95
F1 41	770	670	800	490	510	405	580	430	120	285	95
F1 51	880	700	800	490	620	405	690	430	120	285	95
F1 61	1070	640	800	490	810	405	880	430	120	285	95
F1 81	1270	700	800	490	1010	405	1080	430	120	285	95

	P	Q	R	S	T	U	V	W	X	Y	Z
F1 21	390	435	340	600	720	90	3/4	-	80	80	355
F1 31	390	435	340	600	720	90	3/4	-	80	80	355
F1 41	460	435	340	600	720	90	3/4	-	80	80	410
F1 51	515	435	340	600	720	90	3/4	-	80	80	410
F1 61	398	435	340	600	720	90	3/4	432	80	80	355
F1 81	468	435	340	600	720	90	3/4	495	80	80	410

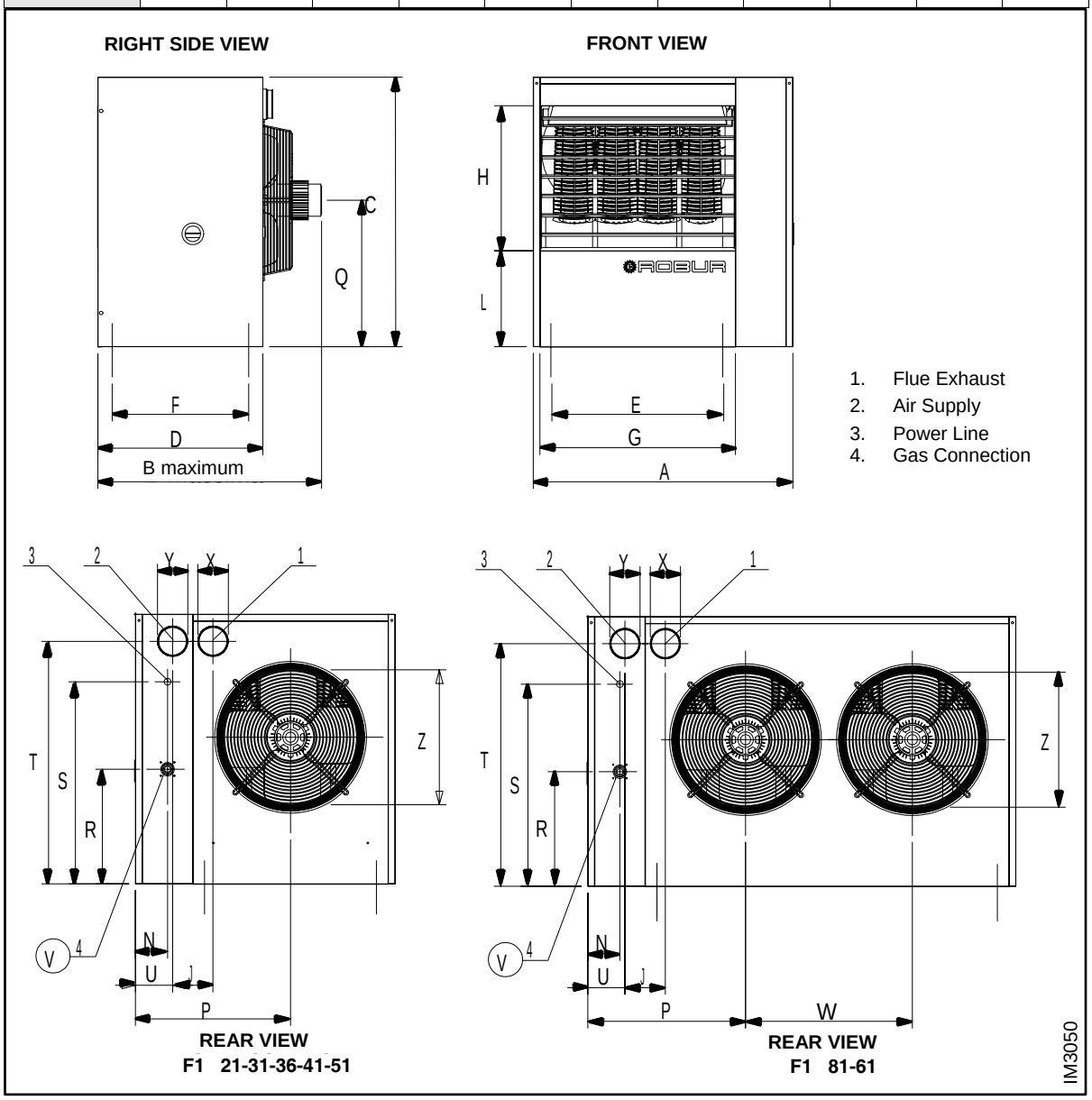


Figure 2

SECTION 3 - INSTALLATION

GENERAL RULES

WARNING!

- A qualified service engineer following the manufacturer's instructions must carry out the installation.
- Qualified engineer means those having specific technical competence according to national/international standards. In any case all necessary information could be obtained directly by Qualified Engineer or Manufacturer.
- An incorrect installation can cause damages to people, animals and property. In case of erroneous installation, the manufacturer cannot be held responsible for such damages.
- The units must be installed according to the national and international norms regarding this type of appliances and applications.

Install the gas supply lines, the electric power lines and a suitable support bracket for the unit according the approved installation project.
Installation procedures should be as follows:

A. Unpack the unit, carefully checking that it has not been damaged. Every unit is factory tested before shipment, therefore, if there are damages, report them immediately to the carrier.

B. The minimum distance from the wall behind the unit must be enough for air circulation. The minimum distance from the lateral walls is given by Figure 3.

C. The recommended height from the floor to the heater base is 2.5 to 3.5 m. It is not recommended to install the appliance under the 2.5m height.

D. A gas cock and a pipe union must be provided for gas supply.

E. Make sure that an adequate gas supply from the gas network is provided, particularly if the unit is supplied with:

Natural gas - G20:
Be sure that the pressure of the gas network, with the unit in operation, is set at 20 mbar (0.29 psig, 8.03 in.WG.) allowed tolerance between 17 and 25 mbar (0.25 to 0.36 psig; 6.9 to 10.0 in.WG.).

LPG (Propane – Butane mix) - G30:
For the first pressure drop required in the supply, it is advisable to install a pressure governor near the liquid gas tank so as to reduce the pressure to 1.5 bar (22 psig). A pressure governor for a second pressure drop should be placed near the heater to reduce the pressure to 30 mbar (0.43 psig; 12.0 in.WG.) allowed tolerance between 20 and 35 mbar (0.29 to 0.50 psig; 8.1 to 14 in.WG.).

LPG (Pure Propane) - G31:
For the first pressure drop required in the supply, it is advisable to install a pressure governor near the liquid gas tank so as to reduce the pressure to 1.5 bar (22 psig). A low pressure governor for a second pressure drop should be placed near the heater to reduce the pressure to 37 mbar (0.43 psig; 12.0 in.WG.) allowed tolerance between 25 and 45 mbar (0.29 to 0.50 psig; 8.1 to 14 in.WG.).

NOTE: In the case of doubt, adjust the appliance as for the propane- butane mix.

F. Carry out the electrical connections according to the installation wiring diagram (see figure 19), checking that the voltage supply is 230/50Hz single-phase. For this operation make sure that:
- all electrical supply parameters are according to those required on the type plate of the appliance.
- wire type is H05 VVF 3x1 mm2 with a maximum external diameter of 8.4 mm.
- when connecting, ensure that the earth wire is longer than the live wires, so that it will be the last wire to break if the supply cable is stretched, thus ensuring a good earth continuity.

NOTE

The electrical safety of the unit is attained only when the unit itself is correctly connected and efficiently grounded according to the existing safety standards. Do not use gas tubes to earth electrical apparatus.

G. The unit should be connected to the electric supply line by means of an omnipolar switch with a minimum contact opening of 3 mm. An omnipolar switch is a ''Double pole isolating switch'', i.e. a switch capable of disconnecting both on phase and neutral. This means that when the switch is opened, both contacts are disconnected.

H. It is mandatory to install a room thermostat connected to the unit according to the installation wiring diagram (figure 19). It is recommended to place the sensor at about 1.5 m from the floor, protected against air draughts, direct exposure to sun rays and direct heat sources (lamps, hot air flows from the unit itself, etc.). If possible, **DO NOT place the thermostat on walls bordering the outside**, to avoid false temperature readings and therefore system operation. **IF THE ROOM THERMOSTAT IS PROPERLY INSTALLED, UNWANTED STARTING AND STOPPING OF THE SYSTEM WILL BE AVOIDED AND ADEQUATE ROOM COMFORT WILL BE ENSURED.** As an alternative to the room thermostat it's possible to install the programmable remote control which could be supplied on request as an optional accessory.

I. To obtain the maximum system efficiency it is advisable to comply with the following rules:

- Install units as close as possible to the work area, taking care that the air flow does not come directly into the contact with people.
- Take obstacles into consideration (columns, etc.)
- For better heat distribution in the case of multiple unit installation, create alternate flows of hot air (see figure 4).
- In some cases it may be suitable to place the units close to the main doors, so they can operate as an air barrier when doors are opened.

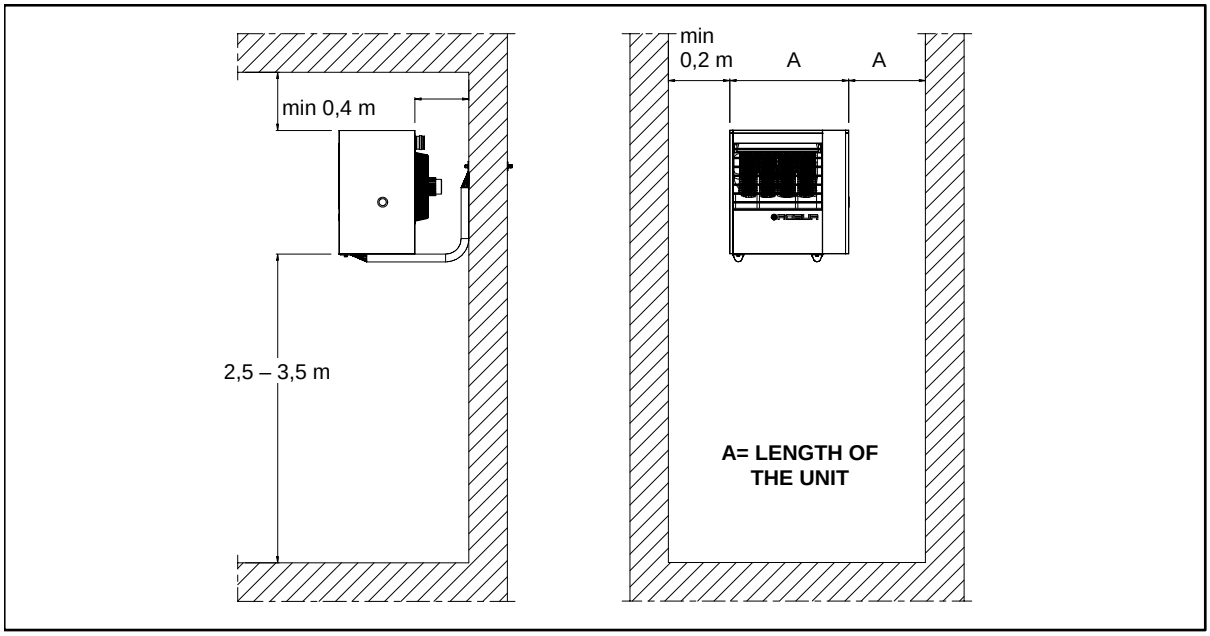


Figure 3
CLEARANCES TO BE RESPECTED

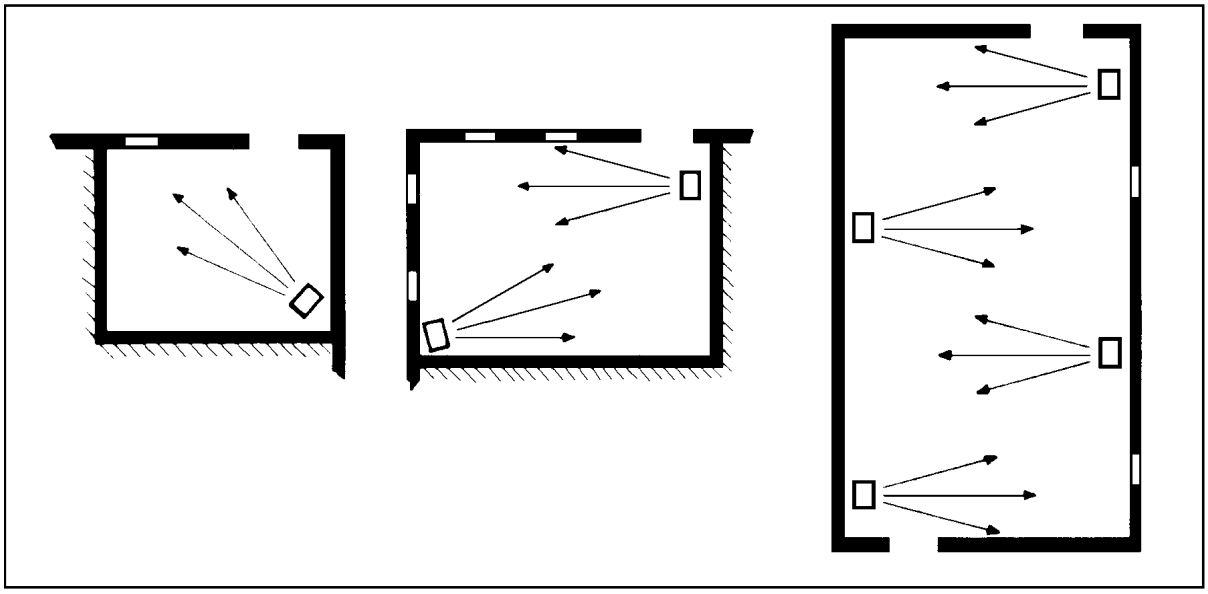


Figure 4
POSITION OF THE UNITS

SIZE AND INSTALLATION OF THE AIR INLET / FLUE EXHAUST

F1 Series gas fired unit heaters can be installed as following:

- **B_{23}** type installation, combustion air taken directly from the room and flue exhaust gases to the outside. This exhaust flue duct can be either horizontal or vertical. This type of installation is not sealed regarding the heated room (see figures 6/7).
- **C_{13} e C_{33}** type installation; room sealed combustion circuit. Appliance with inlet air supply and outlet of exhaust gases with, either, concentric or separate ducts - horizontal (for **C_{13}** see figures 8/9) or vertical ones (for **C_{33}** see figure 10).
- **C_{53}** type installation: room sealed combustion circuit; appliance with inlet air supply and outlet of exhaust gases by using separated ducts and terminals n different walls, for example, the air inlet duct from the wall behind the appliance and the flue exhaust duct on the roof (see figure 11).
- **C_{63}** type installation: allows installing the certified air inlet/flue exhaust ducts, elbows and terminals purchased on the market. Moreover, it permits to use the pipe diameters bigger than 80mm: for example when the installation requires using the pipe of the larger diameter, caused by the longer ducts. With this typology, for the calculus of the flue/air inlet duct refer to the duct manufacturers data and furthermore to the flue composition, flue flow and its temperature. (see table 2).

Use only approved ducts for the installation of the units. Upon request, manufacturer can supply approved rigid pipes, coaxial pipes and terminals.
To determine a correct size of the flue system its total pressure drop has to be calculated.
The allowed pressure drop in the pipe system depends on the model of the unit (see table 2).
Table 3 shows the maximum allowed pressure drop for each unit - diameters Ø80 and Ø100; it shows the losses of the exhaust and air intake flues regarding the coaxial ducts supplied by manufacturer.
External terminals pressure losses are negligible since it is very low.
Check the total inlet/outlet pipes pressure losses regarding maximum values given by table 2. On the next page follows the example of pressure loss calculation and respective duct project. It must be checked that the total amount of the flue system pressure losses are within the minimum and the maximum losses allowed for the unit (see table 2).
Table 4 gives the lengths of the air supply and flue exhaust ducts for different types of installation. These values are APPROXIMATE for the types of installation shown on the figures 6,7,8,9,10 and 11.

Note: When horizontal pipes with lengths above 1 metre are installed, the flue pipe must be mounted with a slope of 2 to 3 cm each 1 metre length (see fig. 5), to prevent entering the condense drops into the unit. In addition, to install correctly the flue exhaust and the air intake terminals, follow the details given in figure 8.

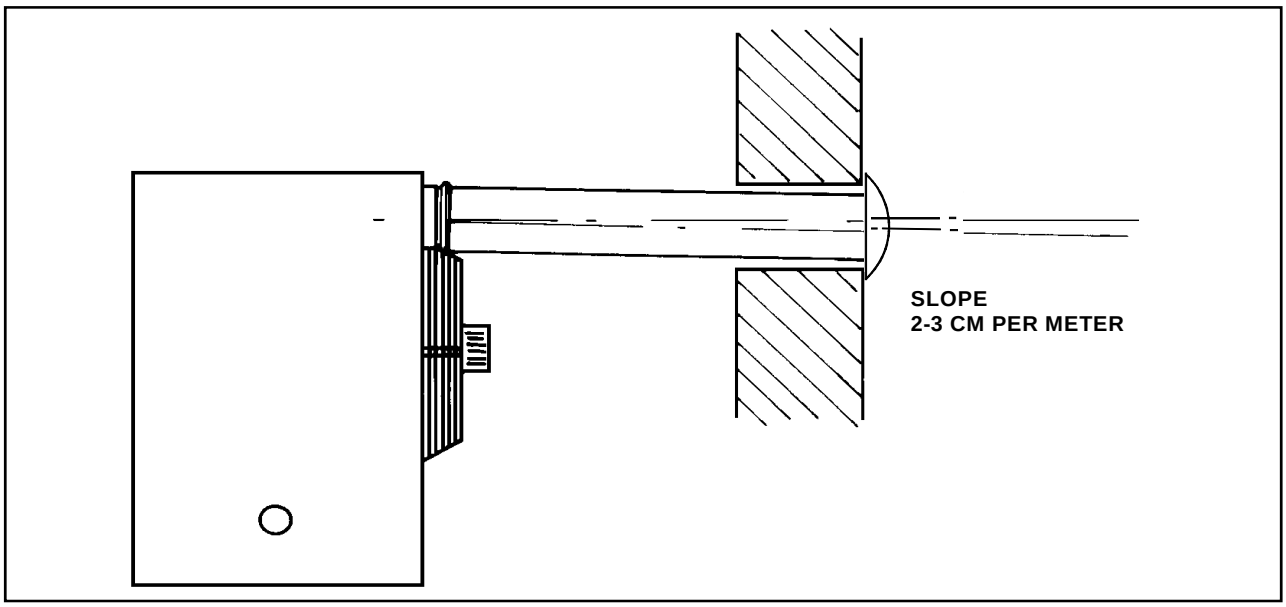


Figure 5
SLOPE OF THE HORIZONTAL FLUE PIPE

Note:
When vertical pipes with length above 3 metres are installed, to prevent that condense drops enter the unit, on base of the vertically mounted flue pipe a T-shaped piece MUST be fitted, in order to collect the condense.

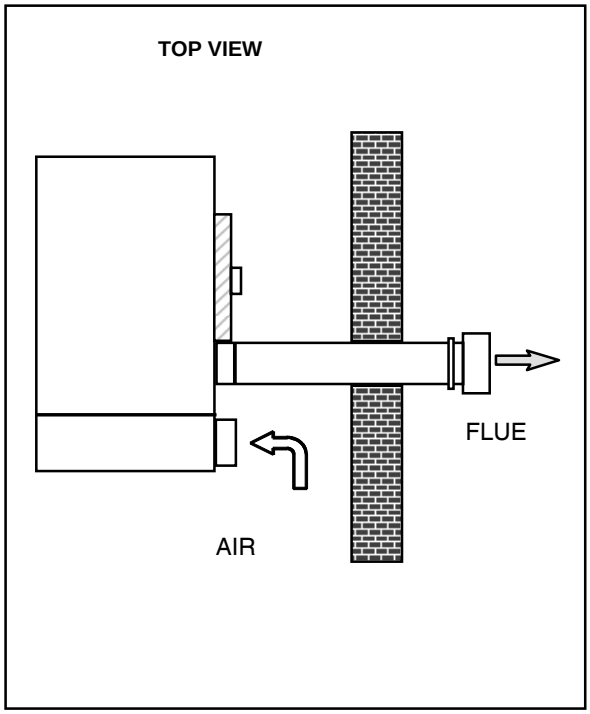


Figure 6
INSTALLATION TYPE B23 WITH WALL TERMINAL

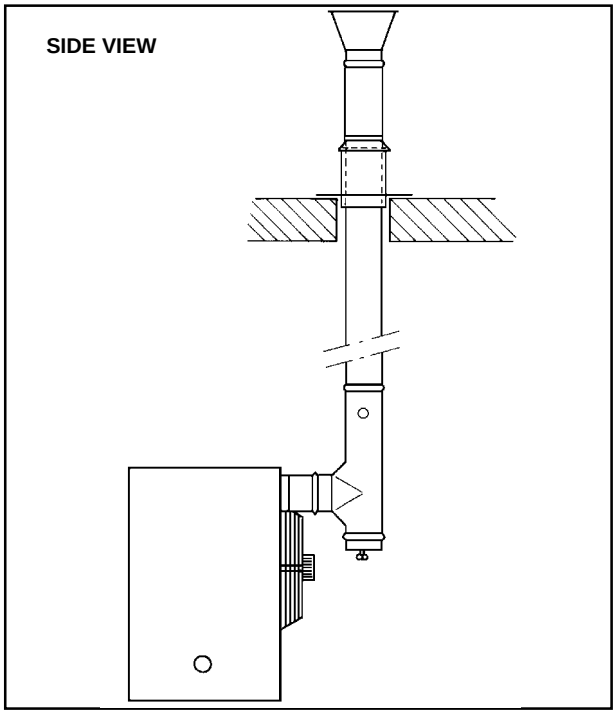


Figure 7
INSTALLATION TYPE B23 WITH ROOF TERMINAL

Mod.	Flue Temperature °C	Flue flow (weight) kg/h	Max. Allowed Pressure loss (Pa)
F1 21	195	38,2	19
F1 31	197	51,0	25
F1 41	205	61,6	30
F1 51	195	80,0	60
F1 61	198	101,5	80
F1 81	195	127,7	85

Table 2

TECHNICAL DATA FOR PIPES SUPPLIED ON REQUEST BY MANUFACTURER											
Mod	Component's pressure loss Ø 80						Component's pressure loss Ø 100				
	Pipe (Pa/m)		Elbow 90° (Pa)		Coaxial		Pipe (Pa/m)		Elbow 90° (Pa)		Coaxial (Pa)
	Flue	Air	Flue	Air	Wall (OSCR007)	Roof (OSCR008)	Flue	Aur	Flue	Air	Roof (OSCR009)
F1 21	0,9	0,5	1,0	1,0	1,7	2,1	0,2	0,2	0,5	0,5	1,2
F1 31	1,4	0,7	2,6	1,3	3,2	8,7	0,3	0,3	1,7	0,8	5,1
F1 41	2,0	1,0	4,2	1,8	4,9	N.P.	0,6	0,6	2,8	1,3	10,1
F1 51	2,3	1,6	6,5	3,5	N.P.	N.P.	1,3	1,0	5,0	2,5	16,9
F1 61	3,5	2,4	9,9	5,7	N.P.	N.P.	2,1	1,1	7,4	4,7	N.P.
F1 81	9	3,4	14,8	11,0	N.P.	N.P.	2,5	1,4	10,9	8,1	N.P.

Table 3
N.P.: INSTALLATION NOT POSSIBLE **N.D.: INSTALLATION** NOT AVAILABLE

TECHNICAL DATA FOR PIPES Ø 130 SUPPLIED ON REQUEST BY MANUFACTURER						
Mod	Component's pressure loss Ø 130					
	Pipe (Pa/m)		Elbow 90 (Pa)		Coaxial (Pa)	
	Flue	Air	Flue	Air	Roof (OKTC001)	Wall (OKTC004)
F1 51	0,8	0,2	2,8	1,2	14	14
F1 61	1,1	0,3	3,2	1,4	19	19
F1 81	1,4	0,5	4,2	1,8	25	25

Table 3A

Note:
For each T-shaped piece an increment of 3 m in length should be added.
For each 45° elbow an increment of 1,2 m in length should be added.

MAXIMAL PIPE LENGTH BY VARIOUS INSTALLATION									
Mod	Type of Installation								
	B 23		C 13			C 33			C 53
	Pipe Ø 80		Separate pipe Ø 80	Coaxial pipe wall		Coaxial pipe Roof			pipe 80
				Ø 125 (OSCR007)	Ø 180 (OKTC004)	Ø 125 (OSCR008)	Ø 150 (OSCR009)	Ø 210 (OKTC001)	
	Horiz.	Verti.		pipe Ø 80	pipe Ø 130	pipe Ø 80	pipe Ø 100	pipe Ø 130	
	flue	flue	air/flue	air/flue	air/flue	air/flue	air/flue	air/flue	air/flue
F1 21	21	16	13+13	12+12	N.D.	8+8	15+15	N.D.	1+15
F1 31	17	14	11+11	10+10	N.D.	5+5	7+7	N.D.	1+14
F1 41	15	11	10+10	8+8	N.D.	N.P.	4+4	N.D.	1+12
F1 51	25	23	14+14	N.P.	15+15	N.P.	8+8	15+15	1+15
F1 61	20	18	11+11	N.P.	12+12	N.P.	6+6	15+15	1+14
F1 81	8	6	5+5	N.P.	10+10	N.P.	n.r.	14+14	1+6

Table 4

N.P.: INSTALLATION NOT POSSIBLE **N.D.: INSTALLATION** NOT AVAILABLE

NOTE

When Your installation does not coincide with values indicated by table 4 (for example installation type C_{13} with air pipe 10m length and flue pipe 16m length) must be checked the total amount of the flue system pressure loss. It is to be within the maximum loss allowed for the unit (see example below).

CALCULUS EXAMPLE

F41 unit with following air/flue system is to be installed:

- 8 meters of flue pipe Ø 80
- 2 elbows 90° Ø 80 on the flue pipe
- 8 meters of air pipe Ø 80

Piping calculus is to be done watching out the maximum allowed pressure drop, which is 30Pa (see table 2).

	Quantity		Pressure drop				
Flue pipe Ø 80	**8**	**x**	**2,0**	**Pa**	**=**	**16,0**	**Pa +**
90° Elbow	**2**	**x**	**4,1**	**Pa**	**=**	**8,4**	**Pa +**
Air pipe Ø 80	**8**	**x**	**1,0**	**Pa**	**=**	**8,0**	**Pa =**
Total pressure drop						**32,4**	**Pa**

The total pressure drop of the system is BIGGER than allowed pressure drop (32,4 Pa HIGHER THAN 30 Pa), therefore the installation is NOT POSSIBLE.

This flue system will be possible only if one of the following actions is taken:

- reduce the flue/air pipe length
- Increase the pipe diameter by using the pipe, Ø100

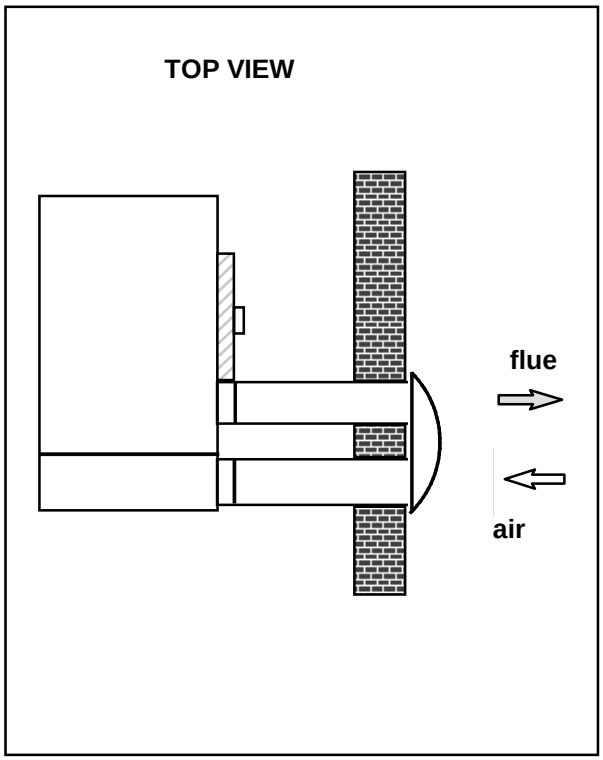


Figure 8
C13 INSTALLATION WITH SEPARATE WALL TERMINAL

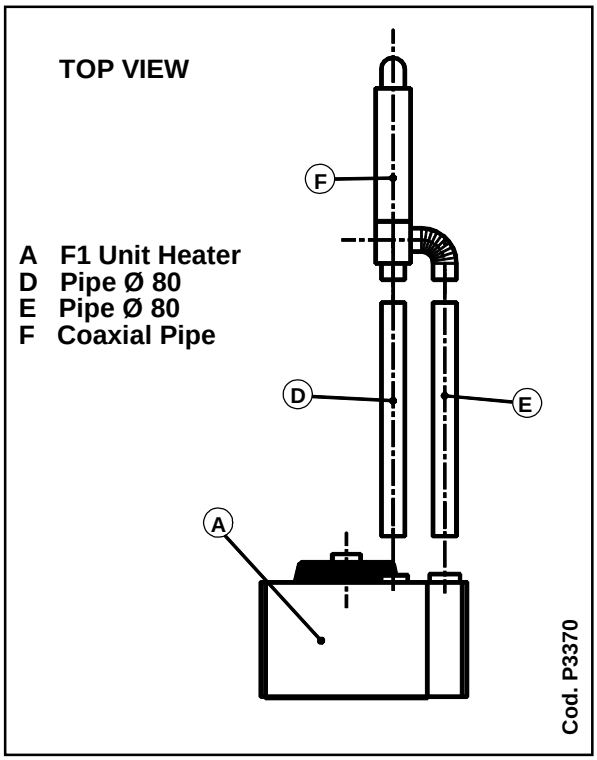


Figure 9
C13 INSTALLATION WITH COAXIAL WALL TERMINAL

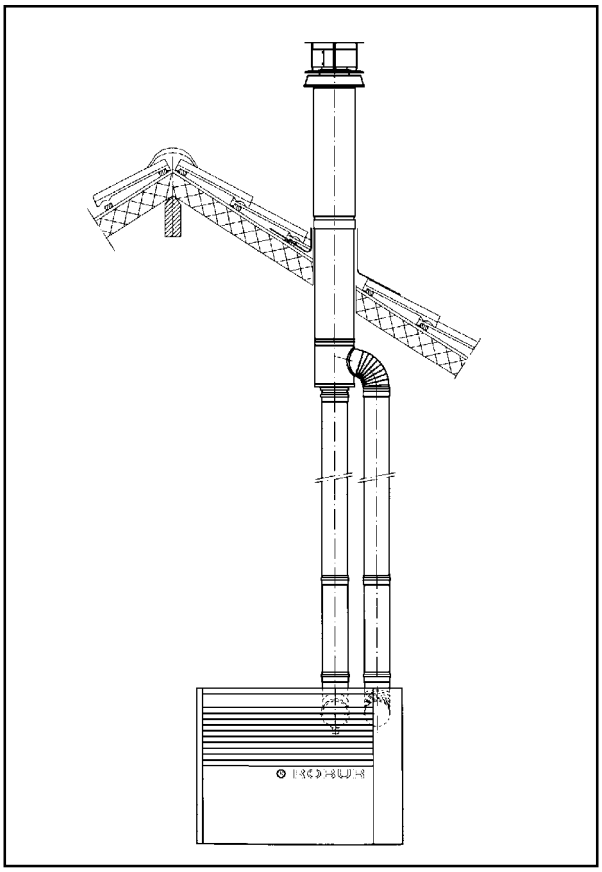


Figure 10
C33 INSTALLATION ROOF COAXIAL TERMINAL

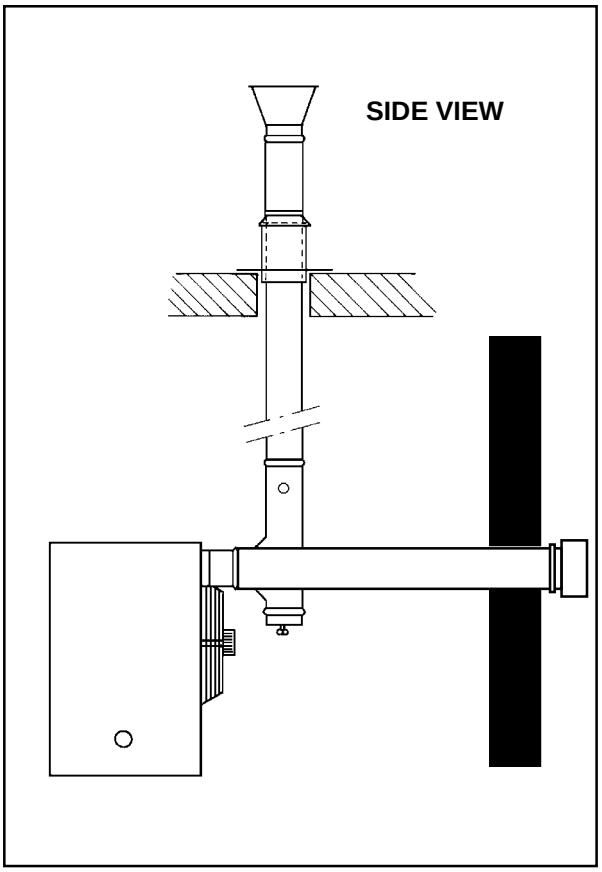


Figure 11
C53 INSTALLATION WITH ROOF FLUE TERMINAL AND WALL AIR SUPPLY PIPE

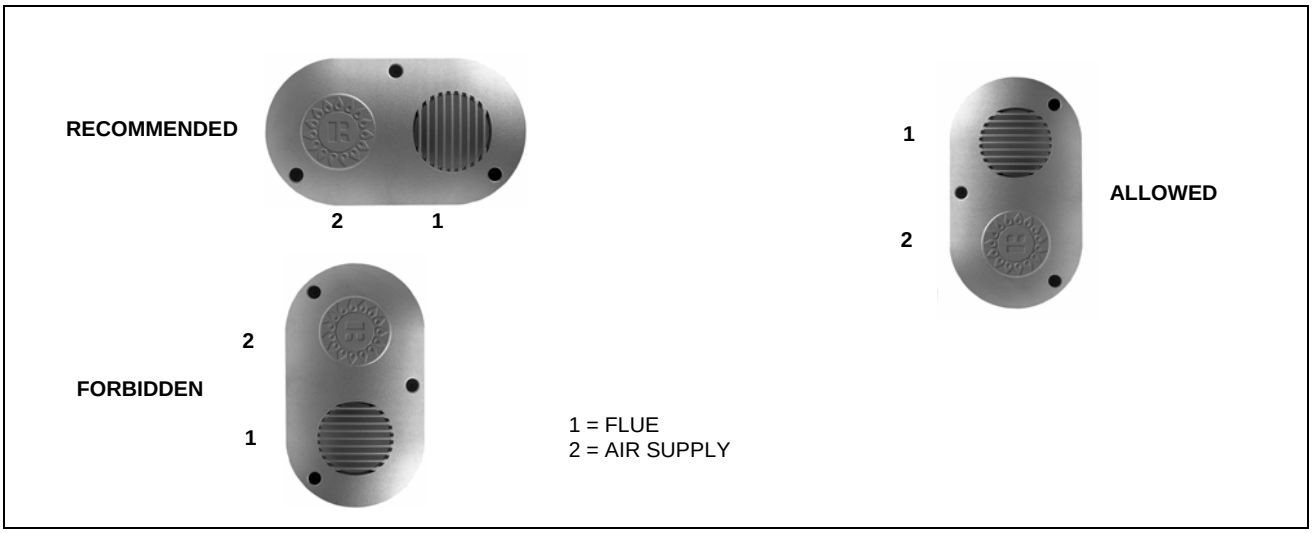


Figure 12
WALL TERMINAL POSITION

Note: If the total length of the flue system exceeds 8 metres, it is advisable to contact the Authorised Engineer or Manufacturer.

SUPPORT BRACKET INSTALLATION

Manufacturer supplies an optional, easy-to-install bracket, specifically designed for each heater. Should you wish not to use these accessories, please refer to the diagram below. Fasten the unit to the support brackets using four M10 bolts.

Model	A
F1 21	370
F1 31	370
F1 41	510
F1 51	620
F1 61	810
F1 81	1010

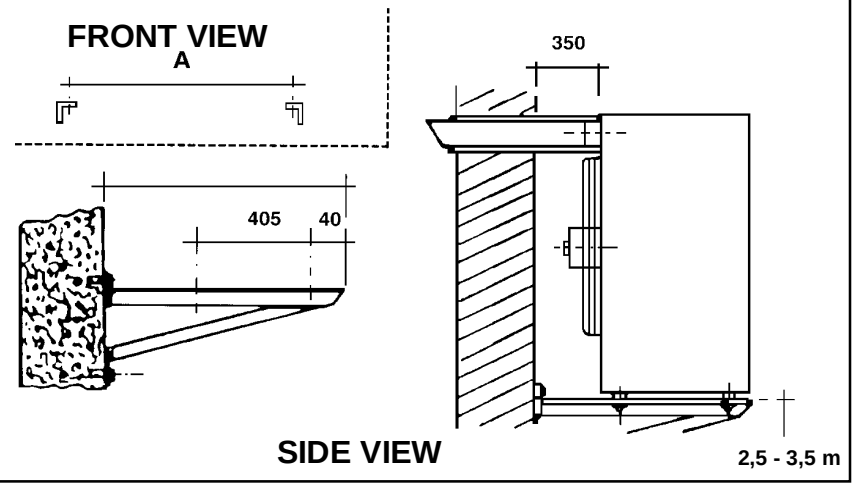


Figure 13
SUPPORT BRACKETS

INSTALLATION OF REMOTE CONTROL BOX

F1 Series appliances are supplied with remote control box, equipped with summer/winter switch, lockout lamp and the reset button (see figure 23). The remote control must be wired according the norms and installed at suitable position. The wiring numeration between 1 – 7 must be respected. The wiring n° 4 and 8 are not connected (free).

WARNING!
Qualified personnel must carry out this operation. Before performing this operation, cut off the electrical supply. The section of every cable core to be used for this operation must be1 mm^2.

To install the remote control box proceed as follows:

- Isolate the unit from power supply.
- Fix the control box in the desired position (maximum distance 20 metres from the gas unit heaters) using expansion bolts.
- Mount the supplied cable of cable with 8 x 1 mm^2 section (maximum length 20 meters). In the case you need longer cable than the supplied one, please contact your local dealer or Robur SpA.
- Connect the control box to the cable.
- Connect the cables of the terminal board inside the unit following the indications given in the installation diagram (see figure 19)
- Connect the power supply
- Start the unit.
- Check that, when the gas supply is cut off, the lock out warning light C on the control box lights up (see figure 23). This operation takes about 40 seconds.
- Press reset button C and check that the unit restarts and the light goes out.
- Press the button A (☼) in order to control the correct operation of the summer/winter function (the burner remains off while the fans are running).

Note: The control cables (specially those linked to the remote control and to the temperature probe) must be kept far away from electrical cables this can be done using e.g shielding or separate pipes for the two types of cables.

BURNER PRESSURE ADJUSTMENT

For correct operation, the burner pressure must be as given in table n°5, n°6 and n°7. The burner gas pressure of each unit is set at the factory and is shown by the labels on the package and by a label inside the control panel of each unit.

In the case the pressure adjustment is necessary keep in mind that:

- Natural Gas: the pressure is to be adjusted by turning the adjustment screw A (figure 14)
- LPG: the adjustment screw is to be screwed down completely to the stop in order to put the pressure regulator out of operation. The reduction of the pressure from the mains is possible by adjusting the low pressure governor installed on the gas supply line (see section 3 – General rules for unit installation - page 6 item E).

Before adjustment of the burner pressure identify TYPE OF THE GAS VALVE installed in the appliance (see figure 14), than proceed as following:

- Connect the manometer to the gas pressure tap E after unscrewing valve setting screw;
- Turn on the appliance;
- Turn clockwise/counterclockwise the setting screw A in order to set the required pressure value. When LPG gas used turn completely the setting screw A, and if the pressure needs an ulterior correction adjust the low pressure gas governor.
- Disconnect the manometer and close the gas tap by tightening adjustment screw.
- Two or three times turn on and turn off appliance to verify the correct and stabile adjustment.
- If necessary it's possible to check the inlet pressure from the gas tap B.

WARNING!

- After setting the gas pressure, stop and start the unit, and check that burner pressure has stabilised. If necessary perform a new adjustment.
- After completing the gas pressure adjustment, seal the valve setting screw.
- Check the gas leakage using the water/soap foam or other suitable method.

BURNER PRESSURE SETTING TABLE MODELS SERIES F1 SUPPLIED WITH NATURAL GAS (G20) (GAS SUPPLY PRESSURE 20 mbar)							
		F1 21	**F1 31**	**F1 41**	**F1 51**	**F1 61**	**F1 81**
Burner Pressure	**(mbar)** **(mmH_2O)**	10,5 107	9,3 95	9,6 98	8,0 81	8,3 85	7,0 71
CO_2 in flue	**(%)**	8,6 – 9,4			8,8 – 9,2		
CO in flue	**(ppm)**	0 - 30					

Table 5

BURNER PRESSURE SETTING TABLE FOR UNITS SUPPLIED WITH LPG (G30) BUTANE OR COMMERCIAL MIX (SUPPLY PRESSURE 30 mbar)							
		F1 21	**F1 31**	**F1 41**	**F1 51**	**F1 61**	**F1 81**
Burner Pressure	**(mbar)** **(mmH_2O)**	28,5 290	28,5 290	28,5 290	27,8 283	28,0 285	26,5 270
CO_2 in flue	**(%)**	10,2 – 11,0			10,5 – 11,0		
CO in flue	**(ppm)**	0 - 30					

Table 6

BURNER PRESSURE SETTING TABLE FOR UNITS SUPPLIED WITH LPG (G31) PROPANE OR COMMERCIAL MIX (SUPPLY PRESSURE 37 mbar)							
		F1 21	F1 31	F1 41	F1 51	F1 61	F1 81
Burner Pressure	**(mbar)** **(mmH_2O)**	36,5 372	36,5 372	36,5 372	35,5 362	35,5 362	33,3 339
CO_2 in flue	**(%)**	10,1 – 10,9			10,4 – 10,9		
CO in flue	**(ppm)**	0 - 30					

Table 7

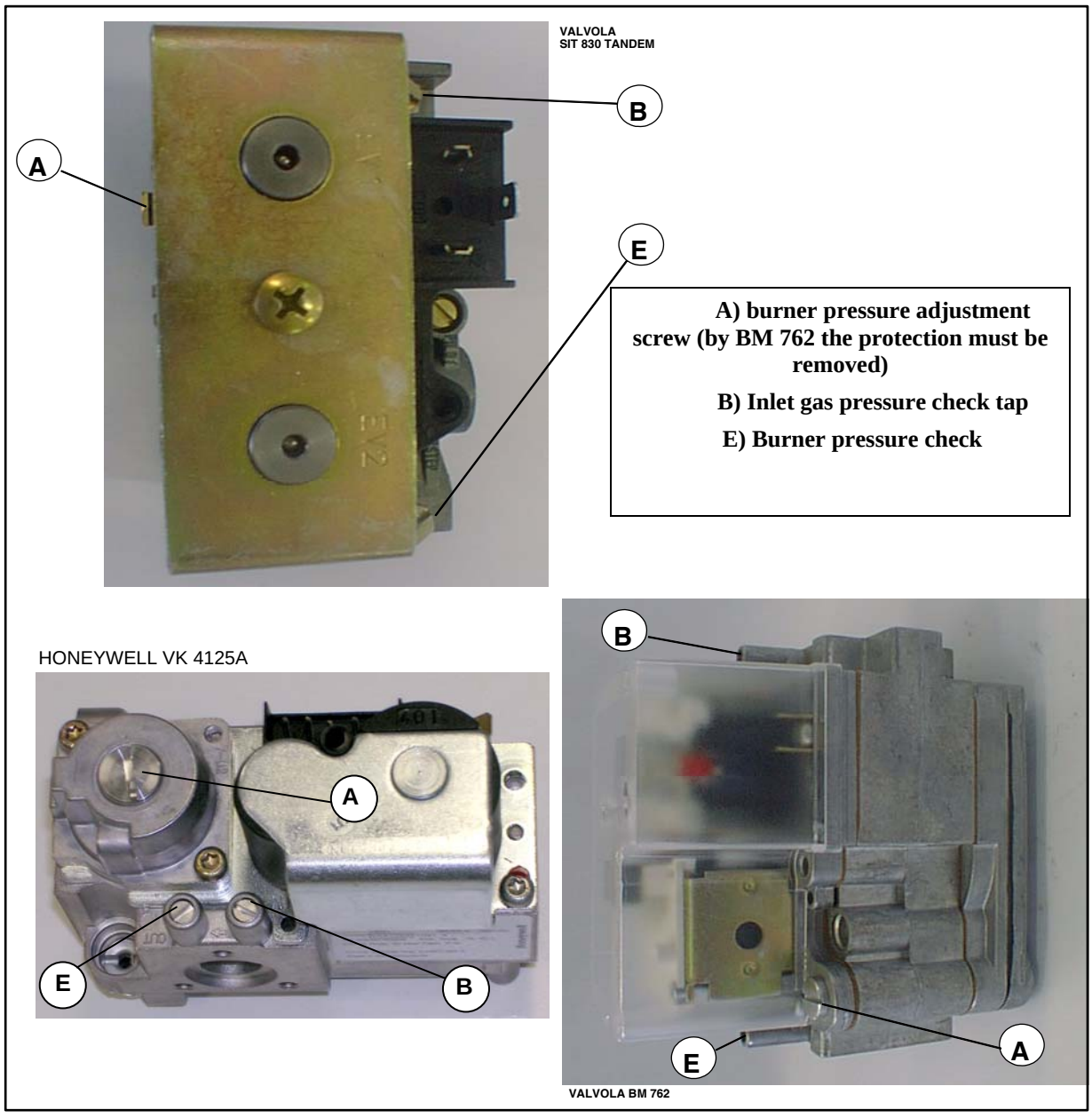


Figure 14

CONVERSION TO ANOTHER TYPE OF GAS

WARNING!

Qualified engineers must carry out this operation. Wrong and careless assembly of the gas circuit may cause dangerous gas leakage. Use adequate seals for all connections.

If the type of gas on the identification label does not correspond to the one that will be used, the unit must be converted and adapted to the type of gas you wish to use.

For this operation proceed as follows:

A) Cut off power and gas supply.

B) Take off the hexagonal ring nut which clamp the gas pipe to the nozzle support (see figure 15). **Pay the attention to the internal round gasket, don't lose or damage it.**

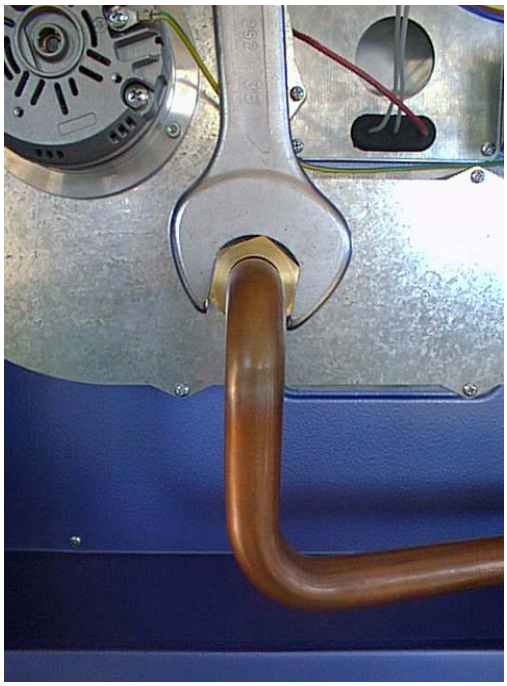


Figure 15

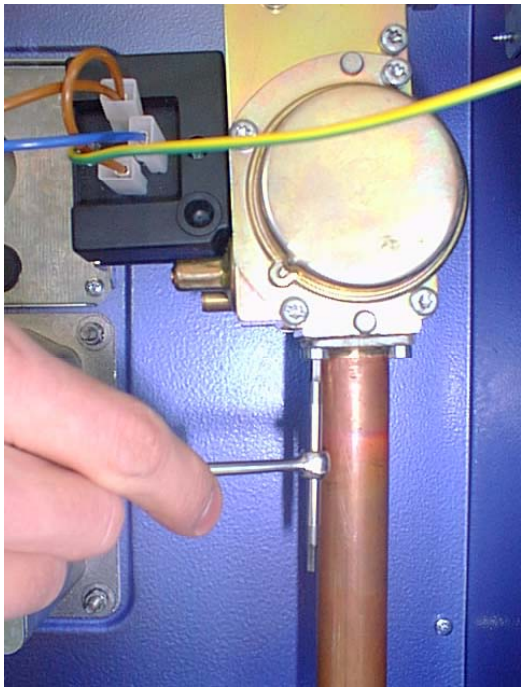


Figure 16

C) Loosen, without removing, 4 screws for fastening the gas supply pipe to the gas valve (figure 16);
D) Shove off the gas pipe and take off the nozzle. If necessary use the screwdriver as to lever it (see figure 17);
E) Take off the gasket and mount it at the new nozzle
F) Thread the new nozzle at the seat;
G) Re-assembly the gas pipe, Check that the round gasket inside the ring nut and the square one at the valve fitting are positioned correctly. Tight the ring nut whit tightening torque of 62±2Nm; tight the valve screws;

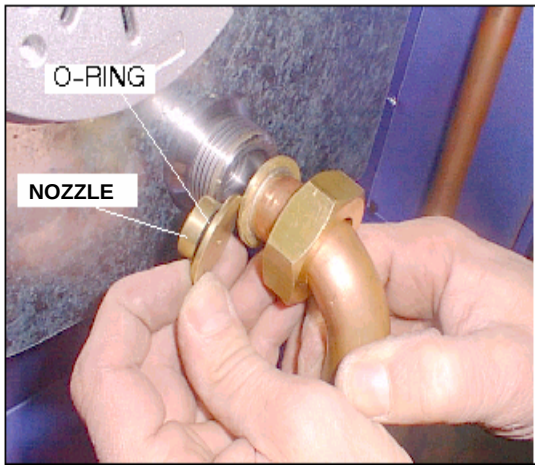


Figure 17

H) Proceed then with the adjustment of the unit, as described in previous chapter ''Burner pressure adjustment''
I) When appliance is on, check for gas leakage with soapy solution or other suitable method. Check all fittings - even those which were not handled during the operation;
J) Replace the label showing the type of gas for which the unit is set with the other one indicating the type of gas actually used.

NOZZLES FOR NATURAL GAS AND LPG						
	F1 21	**F1 31**	**F1 41**	**F1 51**	**F1 61**	**F1 81**
Natural Gas (G20) (mm) **Code**	4,40 072	5,40 073	6,10 075	8,00 076	9,00 077	11,10 078
LPG (G30-G31) (mm) **Code**	2,50 079	3,00 080	3,25 081	3,65 129	4,20 098	4,80 130

Table 7

OPERATING WIRING DIAGRAM

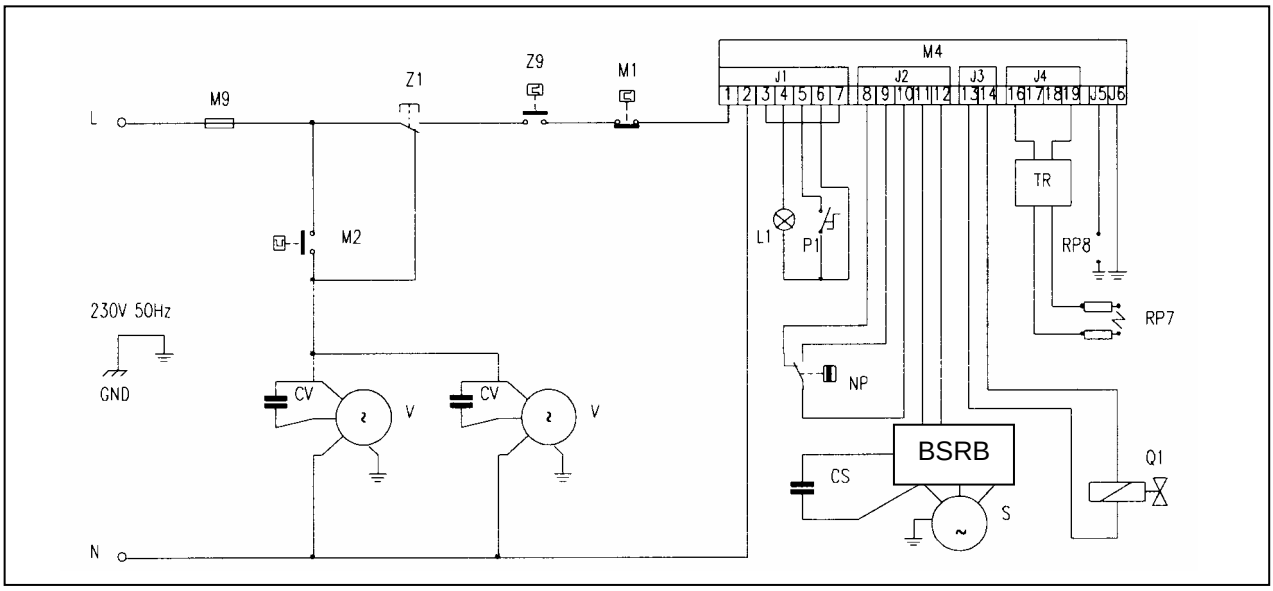


Figure 18

LEGEND:

M9	fuse 5x20 6.3 A F
M2	fan thermostat
CV	fan capacitor (2 pcs. for F1 61/81)
V	fan motor ((2 pcs. for F1 61/81)
Z1	summer/winter switch
Z9	room thermostat
M1	temperature limit thermostat
M4	flame control unit
L1	lockout warning lamp
P1	reset button
BSRB	Blower Speed regulation Board
NP	pressure switch
CS	combustion blower capacitor (only for F1 21,31,41)
S	combustion blower motor
TR	ignition transformer
RP7	ignition electrode
RP8	flame sensor
Q1	gas valve
L	El. Supply – phase
N	El. Supply – neutral
GND	ground

INSTALLATION WIRING DIAGRAM

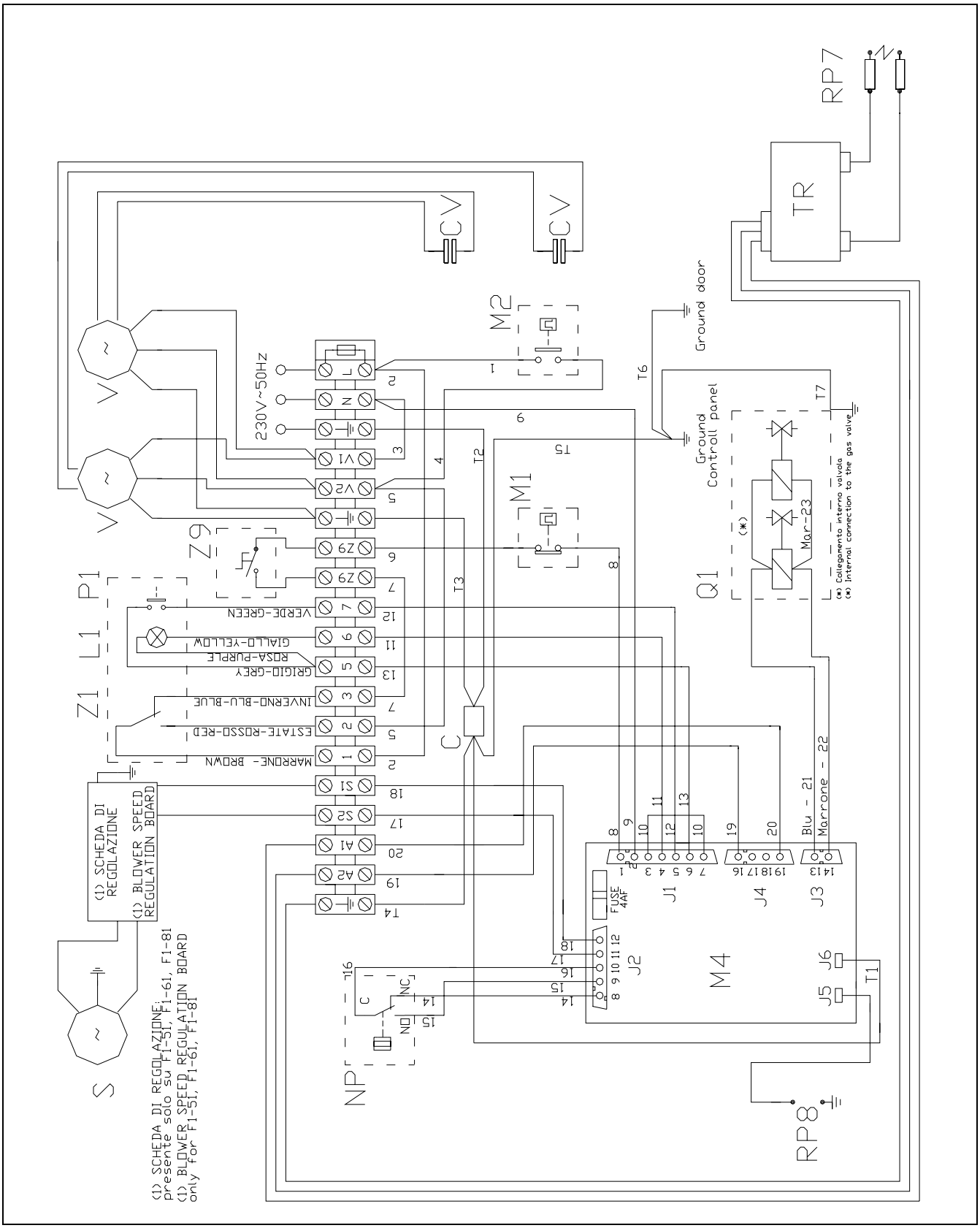


Figure 19
INSTALLATION WIRING DIAGRAM OF F1 SERIES HEATERS (SEE LEGEND FOR FIGURE 18)

WIRING DIAGRAM FOR MULTIPLE UNIT INSTALLATIONS

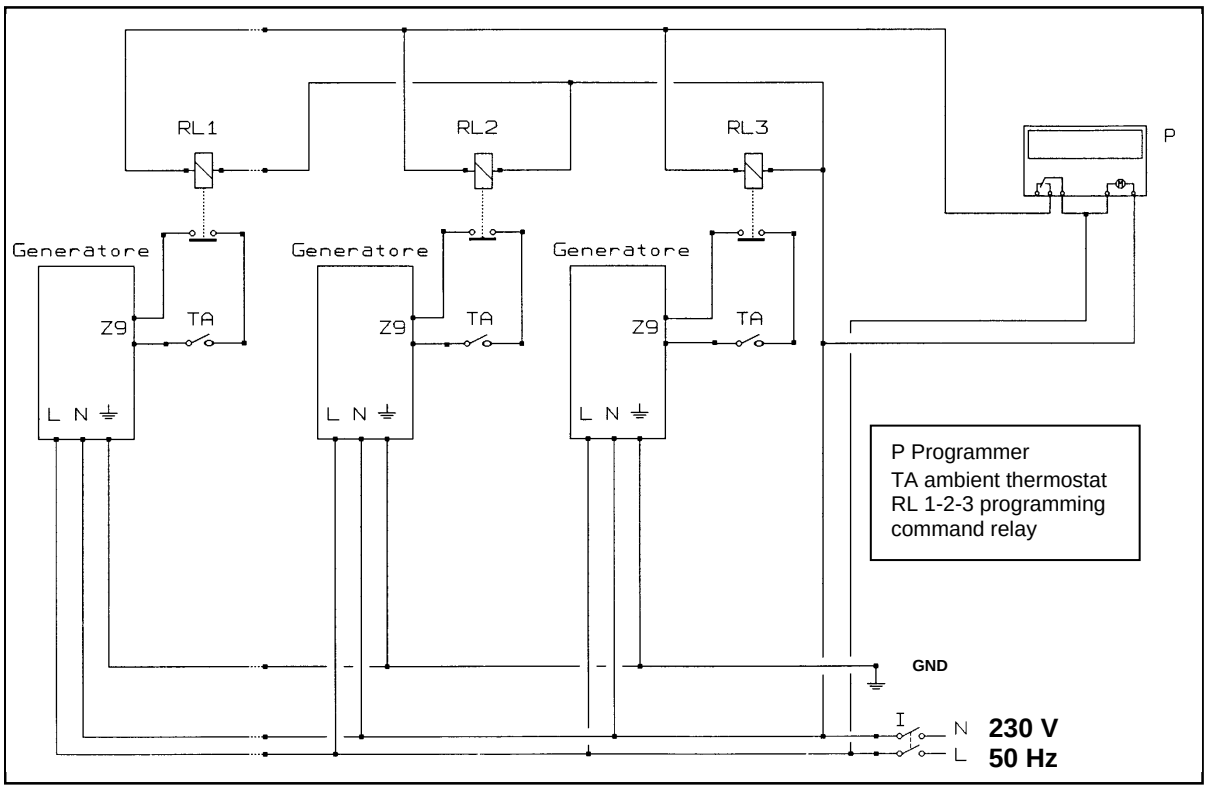


Figure 20
WIRING DIAGRAM FOR MULTIPLE HEATERS INSTALLATION WITH ONE PROGRAMMER AND MORE ROOM THERMOSTATS

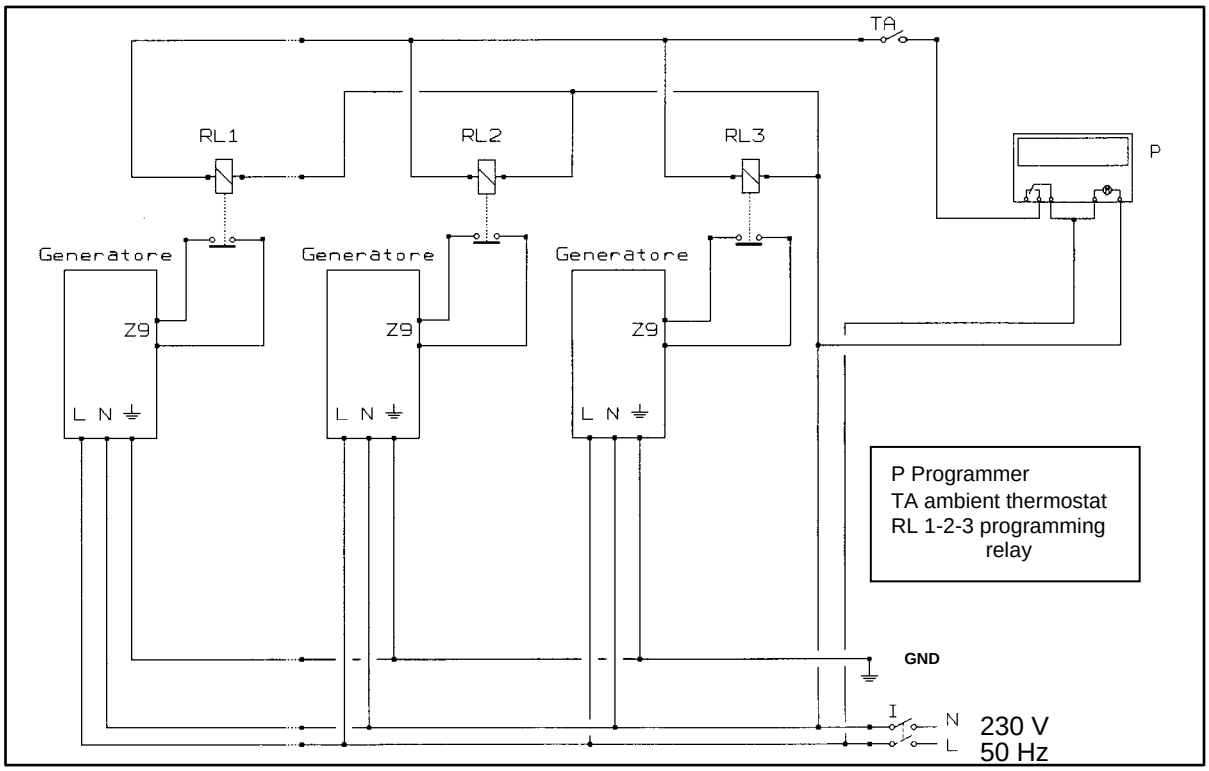


Figure 21
WIRING DIAGRAM FOR MULTIPLE HEATERS INSTALLATION WITH ONE PROGRAMMER AND ONE ROOM THERMOSTATS (MULTIPLE RELAY SOLUTION)

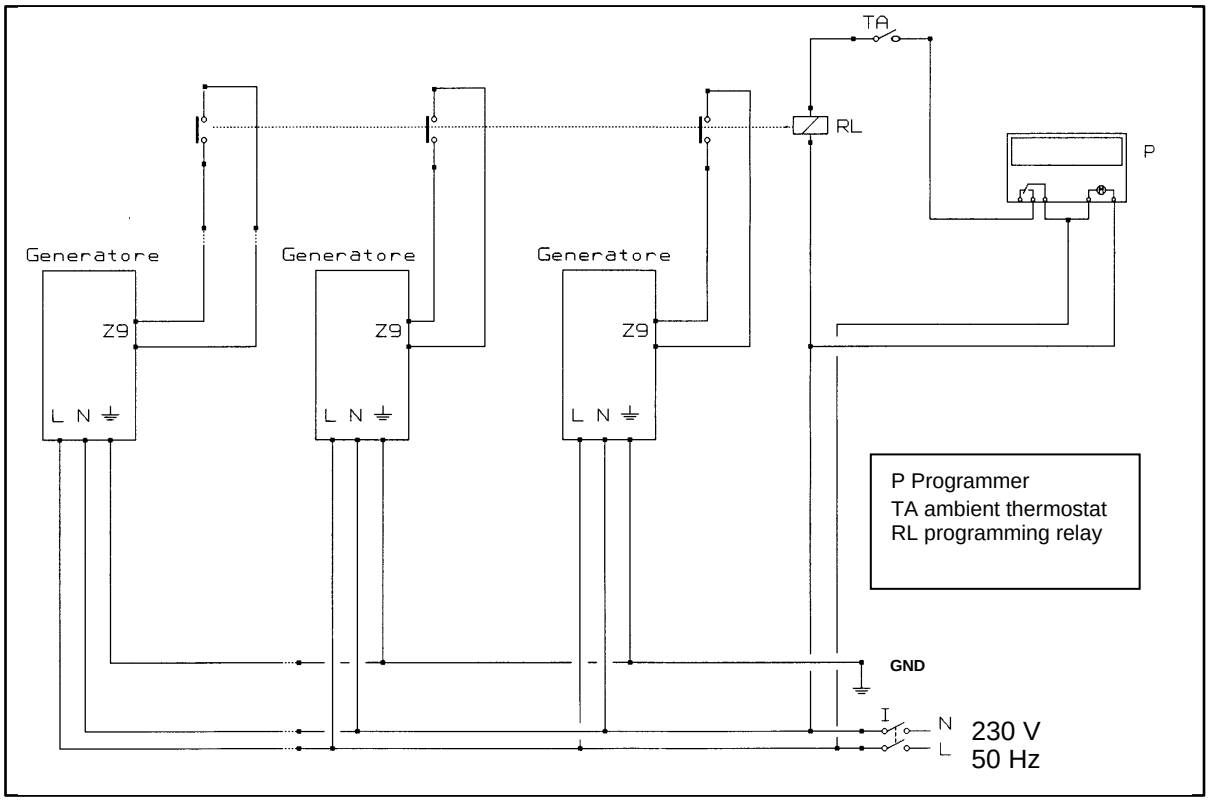


Figure 22

WIRING DIAGRAM FOR MULTIPLE HEATERS INSTALLATION WITH ONE PROGRAMMER AND ONE ROOM THERMOSTATS (ONE RELAY SOLUTION)

SECTION 4 - USE AND OPERATION

START AND STOP OF THE UNIT

WARNING

Qualified service engineer must fulfil the first start-up of the appliance.
Before turning on the heater, a qualified service engineer must check:

- that electric and gas supply ratings are the same as those given in the data plate.
- that the setting is compatible to the heater's power
- that the exhaust duct operates correctly
- that the gas supply pressure is within rating limits
- that combustion air feed and exhaust occur correctly according to the existing standards.

Winter

1) Set the room thermostat to the highest temperature.
2) Check that the gas cock is open.
3) Supply the unit with electric power by closing the omnipolar switch.
4) Press the button A summer/winter in the position winter ❄ (see figure 23)
5) After the pre-purge period (about 40 seconds), the gas solenoid valve opens and the ignition electrode begins to sparkle and lights the burner.
6) When flame detected the flame control box is keeping the gas valve opened.
7) Otherwise the flame control unit locks out the heater: the gas supply to the burner is shut off and a lock-out light C on the reset button B lights up (see figure 23).
8) When default described at item 7) occurs, press the reset button B.
9) If ignition has occurred regularly set the room thermostat to the desired temperature.

WARNING

After a long period of inactivity of the unit or at the first start-up, it may be necessary to repeat the ignition operation a few times due to the presence of air in the piping.

A summer/winter switch:
winter position ❄ for the heating, function
summer position ☼ for the ventilation
B reset button
C lck-out light

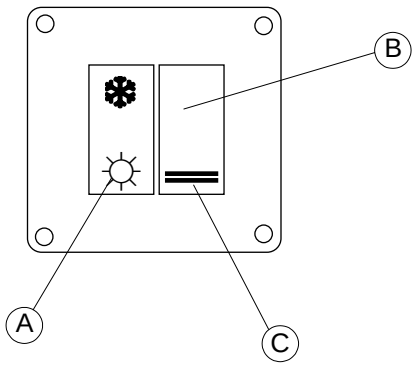


Figure 23
REMOTE CONTROL SWITCH

Stop of the unit

- To turn off the unit, set the room thermostat to the lowest temperature. The burner is turned off, while the fan will continue to operate until the unit is completely cold.

WARNING

In case of long inactivity, after carrying out the above operation and after the fans have turned off, close the gas cock and disconnect the electric supply by using the omnipolar switch placed on the supply line.

NOTE

It is not good practice to turn the unit off by disconnecting the electric power supply, as this may damage the unit. In fact, this causes the immediate stop of the fans, unit overheating and possibly the activation of the temperature limit thermostat.

Summer operation

- Close the gas cock and check the power supply
- Press the button A in the position summer ☼ and fan will start.

End of the season

- Turn off the appliance and wait the arrest of the fans
- Cut off the gas supply of the appliance
- Cut off the electrical supply if summer ventilation is not foreseen

Reset of high limit temperature switch

High limit temperature switch stops the burner if appliance is overheated. It must be reset manually, by pushing the reset button placed on the rear panel of the appliance (remove the protection cap first see figure 24). After resetting replace the protection cap.

Figure 24

WARNING

The activation of the High Limit Temperature Switch indicates ALWAYS the malfunction of the appliance. In case of frequent stops of the unit please contact Client Support service.

SECTION 5 - MAINTENANCE AND SERVICING

REMOVABLE BURNER

The burner mounted inside the F1 Gas Unit Heaters is removable type: this particular construction characteristic allows the cleaning of the burner.

WARNING

The cleaning of the burner is to be done by **qualified personal.**
Erroneous or not correct operation of the gas pipeline can cause dangerous gas leakages on all circuit and particularly on the tamped segment.

To clean the burner proceed as follows:

1. Cut off the electricity and gas supply;
2. Open the side panel of the heater;
3. Demount the hexagonal nut which connect gas pipe and the air blower (see figure 15);
4. Move the gas pipe and remove the gas nozzle (see figure 17);
5. Remove 4 nuts, which fix the casing of air blower;
6. Remove the deflector and gasket;
7. Loose 4 screws which fix the burner, and when the burner is leaned on the bottom unscrew and remove them completely;
8. Insert a pipe inside the burner (ATTENTION: don't bend the burner and don't damage the deflectors inside the burner) and use the pipe as a lever to pull it up and than to remove the burner;
9. Clean the burner with compressed air;
10. Reinsert the burner (MOTE: slot inside the burner must be in the upper position);
11. Fix the lower screws first and than the upper ones. Cross-tighten the screws;
12. Reinsert the diaphragm and relative gaskets;
13. Fix the casing of the air-blower with 4 screws;
14. Insert the nozzle and gasket in the holder of the nozzle;
15. Screw tight the hexagonal which fix the gas pipe to the blower;

This procedure is to be applied once in 2/3 years by normal working conditions, or once per year when there is a lot of impurities in the combustion air (example: "B type" installation of the heater in factories with welding process).

WARNING

Only qualified service engineer authorised by Manufacturer must carry out the operation of servicing and maintenance.

OPERATING FAILURES

Before looking for possible failures, check:

- Correct power supply: 230 V ±10%, 50Hz and adequate grounding.
- Correct Gas supply
- Piping pressure losses within the limits recommended by the manufacturer. Pressure losses higher than limits will result in insufficient gas inlet. Causes for this may be the following:

Natural Gas unit:

a) Poor gas meter performance.

b) The length of the pipes and the number of elbows are excessive with respect to the diameter.

LPG unit:

a) After the first stop of the burner it can not be ignited again. It can be caused by insufficient flow of the pressure governor.

b) If the required pressure is not reached, it may be caused by insufficient gas flow directed from LPG tank, or the length of the pipes and the number of elbows are excessive regarding its diameter.

Only at this point proceed with the specific trouble shooting.

WARNING

Before opening the electric panel door, cut off the power supply to the unit by use of omnipolar switch.

TYPES OF FAILURES AND SERVICING

In case of a failure, call a qualified service engineer.

CASE N°1

The unit locks out during the first ignition phase.

a) The ignition electrodes are broken or badly positioned.

b) The flame sensor is broken or incorrectly positioned or touches some metal part of the unit.

c) Failure in the flame control unit or in its electrical connections.

d) Failure in the gas valve or in its electrical connections.

e) Not efficient grounding installation

f) Air is inside the gas pipes.

g) Wrong adjustment of the gas pressure on the burner.

CASE N°2

The unit locks out during operation.

a) The gas supply is suddenly cut off due to a failure in the gas system. The ignition control repeats the ignition cycle, after which the gas valve closes locking out the unit (accidental gas inlet cut off).

b) The power supply is suddenly cut off due to a failure in the electrical supply mains. If the electrical cut off period is prolonged, the temperature limit thermostat (M1) locks out the unit,

thus preventing re-ignition. When electricity returns, push the reset button which is placed externally, on the rear panel, under the black cover cap (see figure 23).

c) The flame sensor touches the some metal part of the unit, or it is disconnected.

d) The gas valve does not open due to a failure of the valve itself or of its electrical connections.

CASE N°3

The temperature limit thermostat (M1) stops the burner.

a) The heat exchangers have overheated. Check the operation of the fan, gas pressure and nozzles.

b) The exchangers overheat due to accumulation of dirt. Clean the exchangers (dirt can also obstruct rear ventilation grid).

To reset the thermostat, when electricity returns, push the reset button which is placed externally, on the rear panel, under the black cover cap (see figure 24).

CASE N°4

The burner goes out and does not re-ignite even if room temperature requires it.

a) Check the performance of the room thermostat and its electrical connections.

b) Check the position of the room thermostat (check that it is not influenced by external heat sources).

CASE N°5

The exhaust fan will not start.

a) Check that the room thermostat is set on the desired temperature.

b) Check the electrical connections of the exhaust fan and its capacitor.

c) Check integrity of the unit's protection fuse.

d) Make sure that neither the limit nor the safety thermostat have operated.

CASE N°6

The exhaust fan starts but the unit does not ignite.

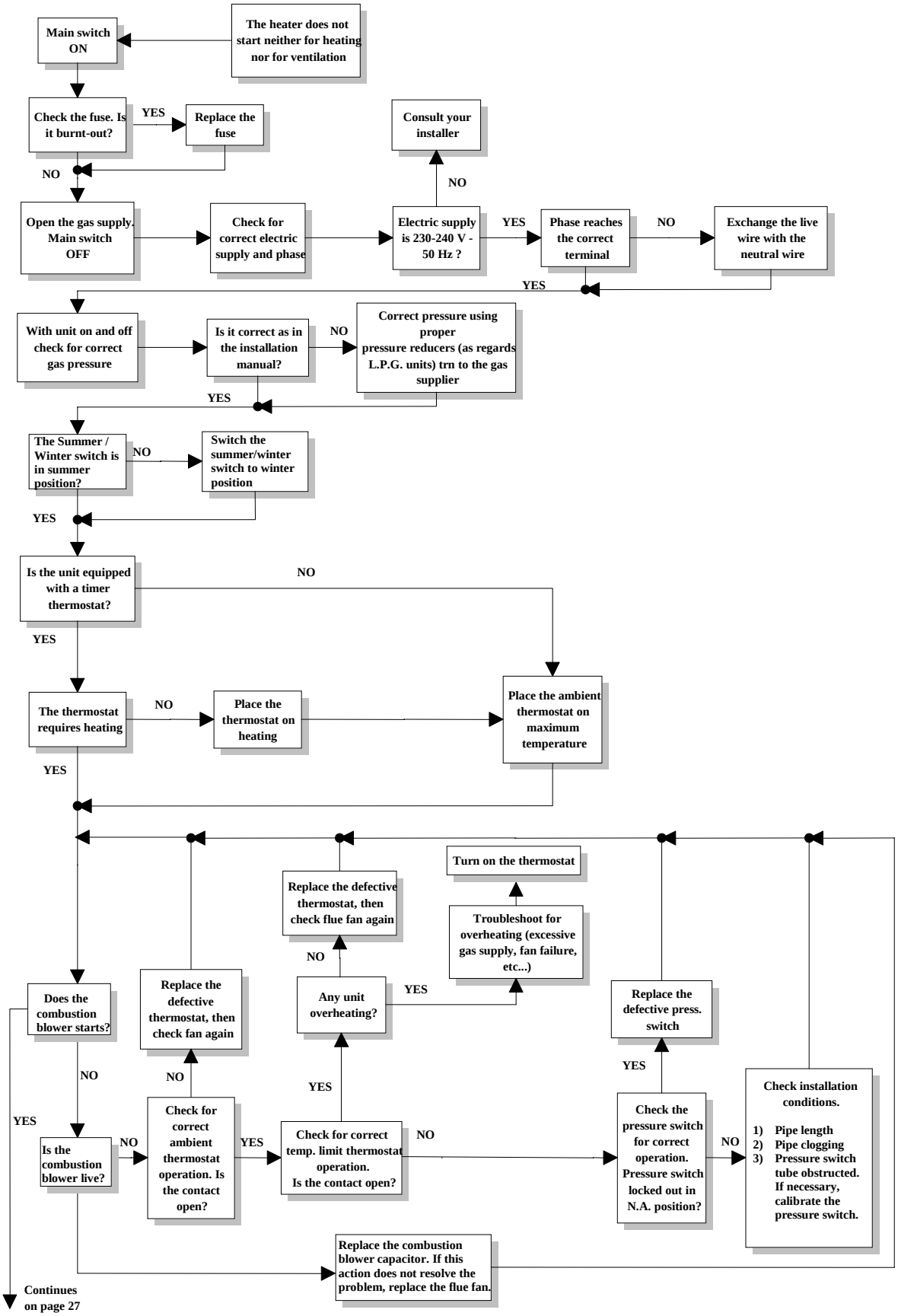
a) Intake and/or exhaust duct are obstructed or too long.

b) The electrical or pneumatic connections of the pressure switch are faulty

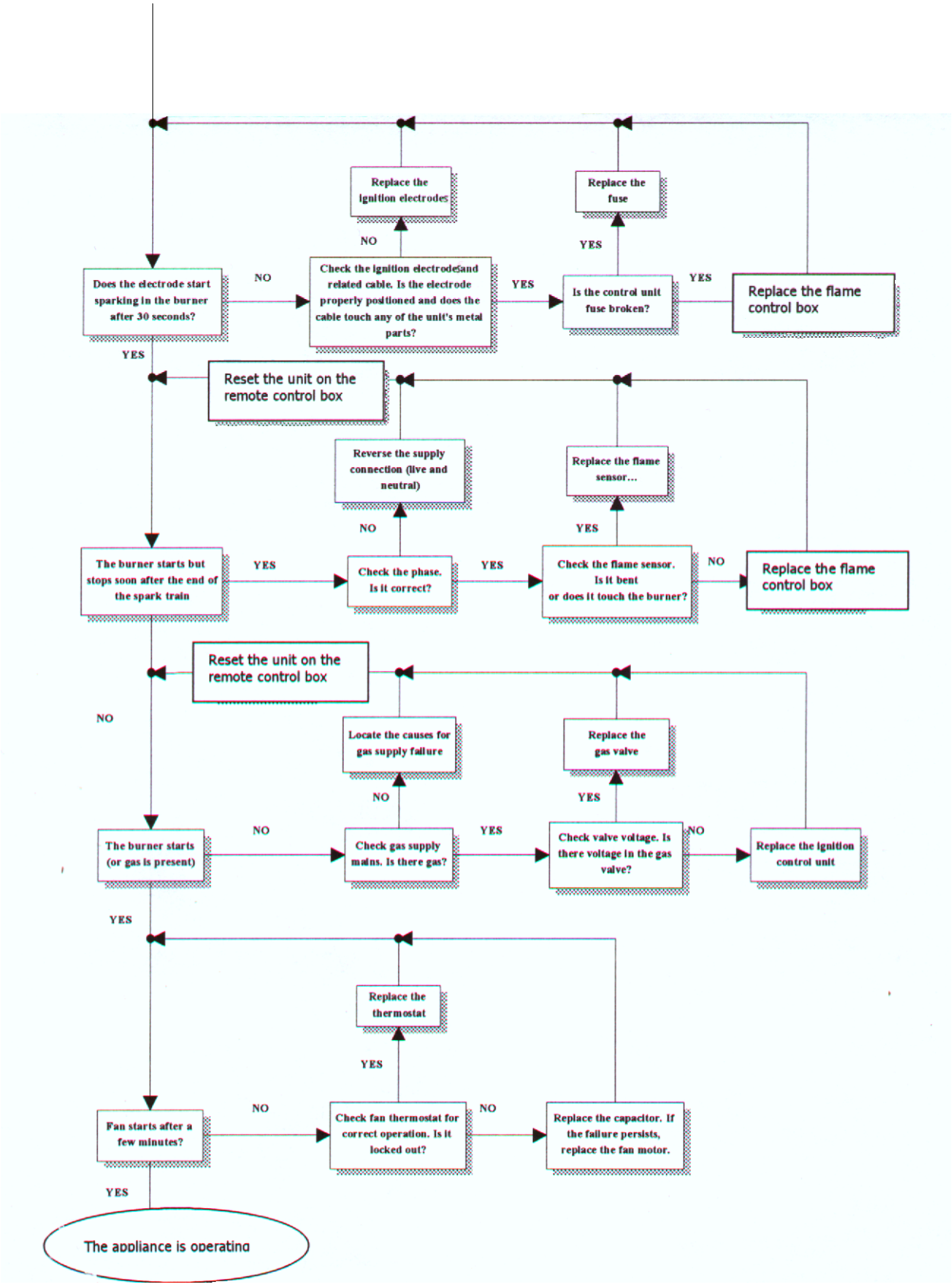
c) The flame control unit does not start the cycle: replace the internal fuse of the flame control unit or the control unit itself.

d) Pressure switch out of setting: replace or adjust it.

TROUBLESHOOTING FLOW CHART


The heater does not start neither for heating nor for ventilation
Main switch ON
Check the fuse. Is it burnt-out?
YES
Replace the fuse
NO
Consult your installer
NO
Open the gas supply. Main switch OFF
Check for correct electric supply and phase
Electric supply is 230-240 V - 50 Hz ?
YES
Phase reaches the correct terminal
NO
Exchange the live wire with the neutral wire
YES
With unit on and off check for correct gas pressure
Is it correct as in the installation manual?
NO
Correct pressure using proper pressure reducers (as regards L.P.G. units) trn to the gas supplier
YES
The Summer / Winter switch is in summer position?
NO
Switch the summer/winter switch to winter position
YES
Is the unit equipped with a timer thermostat?
NO
YES
The thermostat requires heating
NO
Place the thermostat on heating
Place the ambient thermostat on maximum temperature
YES
Turn on the thermostat
Replace the defective thermostat, then check flue fan again
Troubleshoot for overheating (excessive gas supply, fan failure, etc...)
NO
Does the combustion blower starts?
Replace the defective thermostat, then check fan again
Any unit overheating?
YES
Replace the defective press. switch
NO
NO
YES
YES
YES
Is the combustion blower live?
NO
Check for correct ambient thermostat operation. Is the contact open?
YES
Check for correct temp. limit thermostat operation. Is the contact open?
NO
Check the pressure switch for correct operation. Pressure switch locked out in N.A. position?
NO
Check installation conditions.
1) Pipe length
2) Pipe clogging
3) Pressure switch tube obstructed. If necessary, calibrate the pressure switch.
Replace the combustion blower capacitor. If this action does not resolve the problem, replace the flue fan.
Continues on page 27

continued


Replace the ignition electrodes
Replace the fuse
NO
YES
Does the electrode start sparking in the burner after 30 seconds?
NO
Check the ignition electrodesand related cable. Is the electrode properly positioned and does the cable touch any of the unit's metal parts?
YES
Is the control unit fuse broken?
YES
Replace the flame control box
YES
Reset the unit on the remote control box
Reverse the supply connection (live and neutral)
Replace the flame sensor...
NO
YES
The burner starts but stops soon after the end of the spark train
YES
Check the phase. Is it correct?
YES
Check the flame sensor. Is it bent or does it touch the burner?
NO
Replace the flame control box
Reset the unit on the remote control box
NO
Locate the causes for gas supply failure
Replace the gas valve
NO
YES
The burner starts (or gas is present)
NO
Check gas supply mains. Is there gas?
YES
Check valve voltage. Is there voltage in the gas valve?
NO
Replace the ignition control unit
YES
Replace the thermostat
YES
Fan starts after a few minutes?
NO
Check fan thermostat for correct operation. Is it locked out?
NO
Replace the capacitor. If the failure persists, replace the fan motor.
YES
The appliance is operating

With the aim of continuously improving the quality of our products, Robur S.p.A. reserves the right to vary above instructions and drawings without any prior notice.

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Robur is dedicated to dynamic progression
in research, development and promotion
of safe, environmentally-friendly, energy-efficiency products,
through the commitment and caring
of its employees and partners.

Robur Mission

ROBUR®
caring for the environment

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advanced heating
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